IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Yoshiaki KOMMA et al.

Patent No.: RE38,943

Grant Date: 01/24/2006

For: COMPOUND OBJECTIVE LENS FOR OPTICAL DISKS HAVING DIFFERENT THICKNESSES

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.501

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 CFR 1.501, the attention of the U.S. Patent and Trademark Office is hereby directed to the references listed on the attached form SB/42. It is respectfully requested that this Information Disclosure Statement and references be placed in the file.

Since the patentee is making this submission, there is no need to meet the requirements of 37 CFR 1.501(c).

Applicants submit that there is no fee required for this submission, however, please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,
CLARK & BRODY

Christopher W. Brody
Registration No. 33,613

Customer No. 22902
1090 Vermont Ave., N.W., Suite 250
Washington, D.C. 20005
Telephone: 202-835-1111
Facsimile: 202-835-1755
Docket No.: 041-1714BRI
Dated: July 18, 2007

PTO/SB/42 (04-07)
Approved for use through 09/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT

(Sheet 1 of 1)

Docket Number (Optional)	Patent Number
041-1714BRI	RE38,943
Applicant	
Yoshiaki Komma et al.	
Issue Date	**Art Unit**
Jan. 24, 2006	2872

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	0539019A1	9/92	Europe			X	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER	DATE CONSIDERED

THE PATENT OFFICE OF THE PEOPLE'S REPUBLIC OF CHINA

Address: 6 Xi Tu Cheng Lu, Haidian, Beijing Post Code: 100088

Applicant:	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	
Attorney:	LI DESHAN	Date of Notification:
Application No.:	03104464.6	Date: 23 Month: 03 Year: 2007
Title of the Invention:	COMPOUND OBJECTIVE LENS ... WITH THE BINARY FOCUS MICROSCOPE	

Notification of Third Office Action

1. ☒ The examiner received the response submitted by the applicant on **Oct.10,2006** to the **2nd** Office Action and further examination as to substance has been carried out on the above-identified patent application for invention on this new basis.
   ☐ According to the Reexamination Decision made by the Patent Reexamination Board of the Patent Office on _____ examination as to substance on the above-identified application has been resumed.

2. Further examination as to substance has been carried out based on the documents as specified below:
   ☐ The amended application documents attached to the response to the previous Office Action.
   ☒ The application documents based on which the previous examination was carried out and the substitution pages attached to the response to the previous Office Action.
   ☐ The application documents based on which previous examination was carried out.
   ☐ The application documents confirmed by the Reexamination Decision.

3. ☐ No further reference documents are cited in this Office Action.
   ☒ Below is/are the reference document(s) cited in this Notification:

No.	Number(s) or Title(s) of Reference(s)	Date of Publication (or the filing date of conflicting application)
1	EP0539019A1	Date: 17 Month: 9 Year: 1992
2	US5227915A	Date: 13 Month: 7 Year: 1993
3		Date: __ Month: __ Year: ____
4		Date: __ Month: __ Year: ____
5		Date: __ Month: __ Year: ____

4. Conclusions of the Action:
   ☐ On the Specification:
   ☐ The amendments to the description do not comply with Article 33 of the Patent Law.
   ☐ The subject matter contained in the application is not patentable under Article 5 of the Patent Law.
   ☐ The description does not comply with Article 26 paragraph 3 of the Patent Law.
   ☐ The draft of the description does not comply with Rule 18 of the Implementing Regulations.

☒ On the Claims:
- ☐ The amendments to claims _____ do not comply with Article 33 of the Patent Law.
- ☐ Claim(s) _____ is/are not patentable under Article 25 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the definition of inventions prescribed by Rule 2 paragraph 1 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not possess the novelty as required by Article 22 paragraph 2 of the Patent Law.
- ☒ Claim(s) 1-4 does/do not possess the inventiveness as required by Article 22 paragraph 3 of the Patent Law.
- ☐ Claim(s) _____ does/do not possess the practical applicability as required by Article 22 paragraph 4 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with Article 26 paragraph 4 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with Article 31 paragraph 1 of the Patent Law.
- ☒ Claim(s) 1,3 does/do not comply with the provisions of Rules 20-23 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not comply with Article 9 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the provisions of Rule 12 paragraph 1 of the Implementing Regulations.

The detailed explanation of the above conclusions is set forth in the text portion of the Notification.

5. In view of the conclusions set forth above, the Examiner is of the opinion that:
- ☐ The applicant should make amendments to the application documents as directed in the text portion of the Notification.
- ☒ The applicant should expound in the response reasons why the application is patentable and make amendments to the application where there are deficiencies as pointed out in the text portion of the Notification, otherwise, the application will be rejected.
- ☐ The application contains no allowable invention, and therefore, if the applicant fails to submit sufficient reasons to prove that the application does have merits, it will be rejected.
- ☐

6. The followings should be taken into consideration by the applicant in making the response:
(1) Under Article 37 of the Patent Law, the applicant should respond to the office action within 2 months counting from the date of receipt of the Notification. If, without any justified reason, the time limit is not met, the application shall be deemed to have been withdrawn.
(2) Any amendments to the application should be in conformity with the provisions of Article 33 of the Patent Law. Substitution pages should be in duplicate and the format of the substitution should be in conformity with the relevant provision contained in "The Examination Guidelines".
(3) The response to the Notification and/or revision of the application should be mailed to or handed over to the "Reception Division" of the Patent Office, and documents not mailed or handed over to the Reception Divisions have no legal effect.
(4) Without an appointment, the applicant and/or his agent shall not interview with the Examiner in the Patent Office.

9. This Notification contains a text portion of 1 pages and the following attachments:
☒ 2 cited reference(s), totaling 17 pages. ☐

Examination Dept. _____ Examiner: _____ Seal of the Examination Department

Text of the Notification of the Third Office Action

CN Application No. 03104464.6

Claims 1 and 3 do not comply with Rule 21.2 of the IRCPL, because, if the light is a single-wavelength light, then it is impossible for the same one beam of light to converge on both the first information medium and the second information medium after passing through the second region. That is to say, a beam of light cannot have two different focal points after passing through the same region of the lens, and therefore a multi-wavelength light source is the essential technical feature. When the light source has multiple wavelengths, a corresponding wavelength of the light source must be selected according to the kind of the optical disk, thus selecting the wavelength of the light source based on the kind of the optical disk is an essential technical feature for solving the compatibility of multi-thickness information media. Claims 1 and 3 lack the above technical features.

Even if the applicant amends the claims to overcome the above defects, the claims still have the following defects.

Claim 1 has the defect of lacking inventiveness. Reference 1 (EP0539019A1) discloses a focus servo device in an optical disk apparatus, wherein (see Column 3 Line 12 to Column 9 Line 21) the following contents are disclosed: focus error detecting means 4 detects the light information returned from the surface of the optical disk, determines the kind of the optical disk 2 according to the maximum A and minimum B of the detected RF signal, and performs focus servo of the optical disk according to determined kind of optical disk. Performing focus servo control based on focus error signal and the distance between the optical information recording medium and the object lens is commonly used technical means in the art. Claim 1 differs from Reference 1 in

the structure of the optical lens, i.e., the structure of the object lens. Reference 2 (US5227915A) has disclosed a diffractive optical element, in which (see from Column 1 Line 11 to Column 6 Line 61 of the description and Figs.1-5) the following contents have been revealed: a diffractive optical element (equivalent to the optical lens in Claim 1) suitable for optical disk scanning (see Column 1 Lines 11-21); the diffractive optical element has a first phase zone and second phase zone (respectively equivalent to the first region and second region of the optical lens); as shown in Fig.1, one side of the optical element has a curved surface shape, and the phase zones of the optical element transmit at least a part of light and mask out another part of light, based on a difference in phase (see Column 2 Lines 29-36); lasers of different wavelengths have different focal points when passing through the optical element. Reference 2 has given a technical inspiration of applying an optical element having double focal points to optical disk scanning, and based on Reference 1, given the teaching of Reference 2, it is obvious to obtain the technical solution of making information media of different thicknesses compatible using double focal points formed by the optical lens having two regions, by combining Reference 1 with Reference 2. Therefore, Claim 1 does not possess inventiveness as required by Article 22.3 of the CPL with respect to the combination of References 1 and 2. Claim 3 claims an apparatus completely corresponding to the method as claimed in Claim 1. Based on the comments on Claim 1, Claim 3 does not possess inventiveness as required by Article 22.3 of the CPL either.

The additional technical feature of Claim 2 is to perform focus error control based on the sum signal. However, performing focus error control based on the sum signal is commonly used technical means in the art. Therefore, when Claim 1 referred to does not possess inventiveness, Claim 2 does not possess inventiveness as required by Article 22.3 of the CPL either. Due to the same reasons, Claim 4 does not possess inventiveness as required by Article 22.3 of the CPL either.

Due to the reasons above, the applicant shall submit observations or a newly amended application document within the time limit. According to Rule 18 of the IRCPL, when amending the claims, the applicant shall adapt the description, the accompanying drawings and the title of the invention to the new claims, and record the technical solutions(s) of the amended independent claim(s) into the part "Summary of the Invention" of the description. Since the above problems pointed out by the examiner belong to the circumstances that shall be rejected as provided in Rule 53 of the IRCPL, if the applicant fails to present convincing arguments but insists on making no amendments, the application will be rejected. The applicant shall make amendments as required by the notification and any voluntary amendment will render the document not to be accepted. The amendment shall be in line with Article 33 of the CPL and Rule 51 of the IRCPL.

Examiner: DONG Zehua

Code: 9302

中华人民共和国国家知识产权局

20

100037

北京市阜成门外大街2号万通新世界广场8层
中国国际贸易促进委员会专利商标事务所
李德山

E030148

发文日

专利局 2007.3.23 发文

申请号:031044646

申请人:松下电器产业株式会社

发明名称:聚焦控制方法和光盘装置

第 3 次审查意见通知书

1. ☑审查员已收到申请人于2006年10月10日提交的意见陈述书,在此基础上审查员对上述专利申请继续进行实质审查。

☐根据国家知识产权局专利复审委员会于 年 月 日作出的复审决定,审查员对上述专利申请继续实质审查。

☐_____

2. ☐申请人于 年 月 日提交的修改文件,不符合专利法实施细则第51条第3款的规定。

3. 继续审查是针对下述申请文件进行的:

☐上述意见陈述书中所附的经修改的申请文件。

☑前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换页。

☐前次审查意见通知书所针对的申请文件。

☐上述复审决定所确定的申请文件。

☐_____

4. ☐本通知书未引用新的对比文件。

☑本通知书引用下述对比文件(其编号续前,并在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期(或抵触申请的申请日)
1	EP0539019A1	1992-9-17
2	US5227915A	1993-7-13

5. 审查的结论性意见:

☐关于说明书:

☐申请的内容属于专利法第5条规定的不授予专利权的范围。

☐说明书不符合专利法第26条第3款的规定。

☐说明书的修改不符合专利法第33条的规定。

☐说明书的撰写不符合专利法实施细则第18条的规定。

☐_____

☑关于权利要求书:

☐权利要求_____不具备专利法第22条第2款规定的新颖性。

☑权利要求 1-4 不具备专利法第22条第3款规定的创造性。

☐权利要求_____不具备专利法第22条第4款规定的实用性。

☐权利要求_____属于专利法第25条规定的不授予专利权的范围。

☐权利要求_____不符合专利法第26条第4款的规定。

☐权利要求_____不符合专利法第31条第1款的规定。

☐权利要求_____的修改不符合专利法第33条的规定。

☐权利要求_____不符合专利法实施细则第2条第1款的规定。

中华人民共和国国家知识产权局 专利审查业务章 105

回函请寄:100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
(注:凡寄给审查员个人的信函不具有法律效力)

☐权利要求_____不符合专利法实施细则第 13 条第 1 款的规定。
☐权利要求_____不符合专利法实施细则第 20 条的规定。
☑权利要求 1,3 不符合专利法实施细则第 21 条的规定。
☐权利要求_____不符合专利法实施细则第 22 条的规定。
☐权利要求_____不符合专利法实施细则第 23 条的规定。
☐_____
☐分案的申请不符合专利法实施细则第 43 条第 1 款的规定。
上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见，审查员认为：
☐申请人应按照通知书正文部分提出的要求，对申请文件进行修改。
☑申请人应在意见陈述书中论述其专利申请可以被授予专利权的理由，并对通知书正文部分中指出的不符合规定之处进行修改，否则将不能授予专利权。
☐专利申请中没有可以被授予专利权的实质性内容，如果申请人没有陈述理由或者陈述理由不充分，其申请将被驳回。
☐_____

7. 申请人应注意下述事项：
(1) 根据专利法第 37 条的规定，申请人应在收到本通知书之日起的贰个月内陈述意见，如果申请人无正当理由逾期不答复，其申请将被视为撤回。
(2) 申请人对其申请的修改应符合专利法第 33 条和实施细则第 51 条的规定，修改文本应一式两份，其格式应符合审查指南的有关规定。
(3) 申请人的意见陈述书和/或修改文本应邮寄或递交国家知识产权局专利局受理处，凡未邮寄或递交给受理处的文件不具备法律效力。
(4) 未经预约，申请人和/或代理人不得前来国家知识产权局专利局与审查员举行会晤。

8. 本通知书正文部分共有 1 页，并附有下述附件：
☑引用的对比文件的复印件共 2 份 17 页。
☐_____

华董泽印

审查员：董泽华(9302)
2007 年 5 月 8 日

审查部门 审查协作中心

回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
(注：凡寄给审查员个人的信函不具有法律效力)

第三次审查意见通知书正文

申请号：031044646

权利要求1和3不符合专利法实施细则第二十一条第二款的规定，因为如果是单波长的光，那么同一束光经过第二区域不可能既会聚于第一信息媒体又会聚于第二信息媒体，也就是说一束光经过透镜的同一个区域不可能有两个不同的焦点，所以多波长光源是必要技术特征；当光源是多波长时,必须根据光盘的种类选择光源的相应的波长,根据光盘的种类选择光源的波长是解决兼容多厚度信息媒体的必要技术特,权利要求1、3缺少该特征。

即使申请人修改了权利要求书，克服了上述缺陷，权利要求书还存在如下缺陷：

权利要求1还存在不具有创造性的缺陷，对比文件1（EP0539019A1）公开了一种光盘装置中的聚焦伺服设备，其中（说明书第3栏第12行至第9栏第21行）披露了以下内容：聚焦误差检测装置4检测从光盘表面返回的光信息，根据检测到的RF信号的最大值A和最小值B来判别光盘2的种类，进而根据判定的光盘的种类进行相应种类的光盘的聚焦伺服,而根据聚焦误差信号和光学信息记录介质和物镜之间的距离的关系进行聚焦控制是本领域常用技术手段。权利要求1和对比文件1的区别在于光学透镜的结构，也就是物镜的结构,对比文件2（US5227915A）公开了一种衍射光学元件，其中（具体参见说明书第1栏第11行至第6栏第61行以及附图1－5）披露了以下内容：衍射光学元件（对应权利要求1中的光学透镜）适用于光盘扫描（第1栏第11－21行），衍射光学元件具有第一相位区第二相位区（分别对应光学透镜的第一区域和第二区域），如图1所示，光学元件的一侧具有曲面形状，所述光学元件的相位区域更具相位的差异使至少一部分光通过而屏蔽另一部分光（第2栏第29－36行），不同的波长的激光在通过该光学元件时具有不同的焦点。对比文件2给出了将具有双焦点的光学元件用于光盘扫描的技术启示，在对比文件1的技术基础上,根据对比文件2的技术启示，将对比文件1和2结合起来从而得到利用具有两个区域的光学透镜形成的双焦点兼容不同厚度的信息媒体的技术方案是显而易见的，所以相对比文件1和2的结合，权利要求1不具有专利法第二十二条第三款规定的创造性。权利要求3要求保护和权利要求1要求保护的方法完全对应的装置，基于评述权利要求1的理由，同理，权利要求3也不具有专利法第二十二条第三款规定的创造性。

权利要求2的附加技术特征是根据和信号进行聚焦误差控制，然而利用和信号进行聚焦误差控制是本领域常用的技术手段，当其引用的权利要求不具有创造性时，权利要求2也不具有专利法第二十二条第三款规定的创造性，同理，权利要求4也不具有专

利法第二十二条第三款规定的创造性。

针对上述审查意见，申请人应该在指定的期限内进行意见陈述或提交新修改的申请文件，注意修改权利要求书时，应该进行前后一致性修改，根据专利法实施细则第十八条对说明书及其附图作适应性修改,包括发明名称，将修改后的独立权利要求的技术方案记载到说明书的技术方案部分，说明书和权利要求书应该进行一致性修改。由于上述审查意见中指出的问题有的属于专利法实施细则第五十三条规定的驳回情形，因此如果申请人坚持现申请文本不作修改而又不能在意见陈述书中充分论述其符合专利法及其实施细则相关规定的理由，本申请将被驳回；申请人应该按照通知书的要求的进行修改，主动修改将会导致文本不予接受；任何修改都必须符合专利法第三十三条以及实施细则第五十一条之规定，根据专利法实施细则第五十二条的规定，请申请人附上修改前后的对照页。

审查员：董泽华

代码：9302

CCPIT PATENT AND TRADEMARK LAW OFFICE

PATENT DEVELOPMENT INTERNATIONAL, INC.
PATENT AND TRADEMARKS
6TH TOMIZAWA BLDG, 3F
12-5, YOTSUYA 2-CHOME
SHINJUKU-KU, TOKYO 160-0004
JAPAN 日本

10/F, Ocean Plaza
158 Fuxingmennei Street,
Beijing 100031, China
Telephone: 86-10-66412345
Facsimile : 86-10-66415678
86-10-66413211
E-mail : mail@ccpit-patent.com.cn
Web site : www.ccpit-patent.com.cn

April 06, 2007

FAX No.: 0081333550115

Y/R: CN5-93124-SK-B
O/R: IIE030153
Re: Chinese Application for Invention No. 03104463.8
In the name of MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Title: COMPOUND OBJECTIVE LENS ... WITH THE BINARY FOCUS MICROSCOPE

Dear Sirs:

This is to report to you that we have received the third Office Action issued by the Chinese Patent Office on **March 23, 2007** in connection with the above-identified patent application. Enclosed please find a copy of the Office Action and the English translation thereof.

In the Office Action, the examiner objects to independent claims 1 and 4 as lacking essential features for solving the technical problem. We suggest reciting in these claims the features concerning "multi-wavelength light source" and "selection of the wavelength of the light source based on the kind of the optical disk", so as to overcome the objection.

The examiner further cites Reference 3, and objects to claims 1-9 as lacking inventiveness over the combination of Reference 2 cited in previous Office Action and Reference 3. In order to overcome the objection, the applicant will need to analyze the differences between the independent claims and the references, and emphasize the advantageous technical effects produced by the distinguishing features.

Please note that a response to the Office Action is due on **May 23, 2007**. Your instructions given two weeks before the due date would be highly appreciated.

For your information, the applicant may request an extension of time only once (either one or two months) upon payment of extension fees. Since no further extension of time is permitted, it is advised that the applicant extend the time for two months if necessary.

If you have any questions concerning this matter, please feel free to let us know.

Sincerely yours,

Du Juan
CCPIT Patent and Trademark Law Office

Notice

This firm will be closed from 11:30 of April 30, 2007 to May 7, 2007 for the Labour Day. We shall appreciate it if you could forward us papers to be filed during this period well before April 28, 2007.

中华人民共和国国家知识产权局

100037 北京市阜成门外大街2号万通新世界广场8层 中国国际贸易促进委员会专利商标事务所 李德山 Z-030153	发文日
申请号：031044638	
申请人：松下电器产业株式会社	
发明名称：聚焦控制方法和光盘装置	

专利局 2007.3.23 发文

第 3 次审查意见通知书

1. ☑审查员已收到申请人于2006年10月10日提交的意见陈述书，在此基础上审查员对上述专利申请继续进行实质审查。

☐根据国家知识产权局专利复审委员会于　　年　月　日作出的复审决定，审查员对上述专利申请继续实质审查。

☐_____

2. ☐申请人于　　年　月　日提交的修改文件，不符合专利法实施细则第51条第3款的规定。

3. 继续审查是针对下述申请文件进行的：

☐上述意见陈述书中所附的经修改的申请文件。

☑前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换页。

☐前次审查意见通知书所针对的申请文件。

☐上述复审决定所确定的申请文件。

☐_____

4. ☐本通知书未引用新的对比文件。

☑本通知书引用下述对比文件（其编号续前，并在今后的审查过程中继续沿用）：

编号	文件号或名称	公开日期（或抵触申请的申请日）
3	US5227915A	1993-7-13

5. 审查的结论性意见：

☐关于说明书：

☐申请的内容属于专利法第5条规定的不授予专利权的范围。

☐说明书不符合专利法第26条第3款的规定。

☐说明书的修改不符合专利法第33条的规定。

☐说明书的撰写不符合专利法实施细则第18条的规定。

☐_____

☑关于权利要求书：

☐权利要求_____不具备专利法第22条第2款规定的新颖性。

☑权利要求 1-9 不具备专利法第22条第3款规定的创造性。

☐权利要求_____不具备专利法第22条第4款规定的实用性。

☐权利要求_____属于专利法第25条规定的不授予专利权的范围。

☐权利要求_____不符合专利法第26条第4款的规定。

☐权利要求_____不符合专利法第31条第1款的规定。

☐权利要求_____的修改不符合专利法第33条的规定。

☐权利要求_____不符合专利法实施细则第2条第1款的规定。

☐权利要求_____不符合专利法实施细则第13条第1款的规定。

中华人民共和国国家知识产权局 专利审查业务章 105

☐权利要求_____不符合专利法实施细则第20条的规定。
☑权利要求 1,4 不符合专利法实施细则第21条的规定。
☐权利要求_____不符合专利法实施细则第22条的规定。
☐权利要求_____不符合专利法实施细则第23条的规定。
☐_____
☐分案的申请不符合专利法实施细则第43条第1款的规定。
上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见，审查员认为：
☐申请人应按照通知书正文部分提出的要求，对申请文件进行修改。
☑申请人应在意见陈述书中论述其专利申请可以被授予专利权的理由，并对通知书正文部分中指出的不符合规定之处进行修改，否则将不能授予专利权。
☐专利申请中没有可以被授予专利权的实质性内容，如果申请人没有陈述理由或者陈述理由不充分，其申请将被驳回。
☐_____

7. 申请人应注意下述事项：
(1) 根据专利法第37条的规定，申请人应在收到本通知书之日起的贰个月内陈述意见，如果申请人无正当理由逾期不答复，其申请将被视为撤回。
(2) 申请人对其申请的修改应符合专利法第33条和实施细则第51条的规定，修改文本应一式两份，其格式应符合审查指南的有关规定。
(3) 申请人的意见陈述书和/或修改文本应邮寄或递交国家知识产权局专利局受理处，凡未邮寄或递交给受理处的文件不具备法律效力。
(4) 未经预约，申请人和/或代理人不得前来国家知识产权局专利局与审查员举行会晤。

8. 本通知书正文部分共有 2 页，并附有下述附件：
☑引用的对比文件的复印件共 1 份 9 页。
☐_____

审查员：董华 (9302)
2007年3月10日

审查部门 审查协作中心

回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
（注：凡寄给审查员个人的信函不具有法律效力）

第三次审查意见通知书正文

申请号：031044638

权利要求1和4不符合专利法实施细则第二十一条第二款的规定，因为如果是单波长的光，那么同一束光经过第二区域不可能既会聚于第一信息媒体又会聚于第二信息媒体，也就是说一束光经过透镜的同一个区域不可能有两个不同的焦点，所以缺少多波长光源的必要技术特征；当光源是多波长时,必须根据光盘的种类选择光源的相应的波长,根据光盘的种类选择光源的波长是解决兼容多厚度信息媒体的必要技术特，因此权利要求1、4缺少该特征。。

即使申请人修改了权利要求书，权利要求书还存在不具有创造性的缺陷，

权利要求1不具有创造性，因为对比文件3（US5227915A）公开了一种衍射光学元件，其中（具体参见说明书第1栏第11行至第6栏第61行以及附图1－5）披露了以下内容：衍射光学元件（对应权利要求1中的光学透镜）适用于光盘扫描（第1栏第11－21行），衍射光学元件具有第一相位区第二相位区（分别对应光学透镜的第一区域和第二区域），如图1所示，光学元件的一侧具有曲面形状，所述光学元件的相位区根据相位的差异使至少一部分光通过而另一部分光被屏蔽（第2栏第29－36行），而且不同的波长的激光在通过该光学元件时具有不同的焦点。对比文件3给出了将具有双焦点的光学元件用于光盘扫描的技术启示，在对比文件2披露了根据RF信号的幅值判断光盘的种类，根据RF信号的幅值可以判断未知光盘的厚度（参见第一次审查意见通知书），根据对比文件3的技术启示，将对比文件3和2结合起来从而得到利用具有两个区域的光学透镜形成的双焦点兼容不同厚度的信息媒体的技术方案是显而易见的，所以相对比文件3和2的结合，权利要求1不具有专利法第二十二条第三款规定的创造性。权利要求4要求保护和权利要求1要求保护的方法完全对应的装置，基于评述权利要求1的理由，同理，权利要求4也不具有专利法第二十二条第三款规定的创造性。

权利要求2的附加技术特征是根据根据信息媒体的种类进行聚焦控制,对比文件2已经给出了根据光盘的种类进行聚焦控制的技术启示,那么根据不同光盘的技术特征进行聚焦控制是本领域技术人员常规的技术手段，当其引用的权利要求不具有创造性时，权利要求2也不具有专利法第二十二条第三款规定的创造性，同理，权利要求6也不具有专利法第二十二条第三款规定的创造性。

权利要求3也不具有创造性,对比文件2已经披露了根据RF信号的幅值AB判断光盘种类的内容,光盘的种类也就表明的光盘的厚度也就是透明部分的厚度,当其引用的权利要求不具有创造性时，权利要求3也不具有专利法第二十二条第三款规定的创造性；同理，权利要求8也不具有专利法第二十二条第三款规定的创造性。

权利要求5也不具有创造性,对比文件2已经披露了光盘厚度不同的内容,而且对比文件3附图1已经披露了根据离光轴距离不同划分光学元件的相位区的内容,当其引用的权利要求不具有创造性时，权利要求5也不具有专利法第二十二条第三款规定的创造性；同理，权利要求7、9也不具有专利法第二十二条第三款规定的创造性。

针对上述审查意见，申请人应该在指定的期限内进行意见陈述或提交新修改的申请文件，注意修改权利要求书时，应该进行前后一致性修改，根据专利法实施细则第十八条对说明书及其附图作适应性修改,包括发明名称，将修改后的独立权利要求的技术方案记载到说明书的技术方案部分，说明书和权利要求书应该进行一致性修改。由于上述审查意见中指出的问题有的属于专利法实施细则第五十三条规定的驳回情形，因此如果申请人坚持现申请文本不作修改而又不能在意见陈述书中充分论述其符合专利法及其实施细则相关规定的理由，本申请将被驳回；申请人应该按照通知书的要求的进行修改，主动修改将会导致文本不予接受；任何修改都必须符合专利法第三十三条以及实施细则第五十一条之规定，根据专利法实施细则第五十二条的规定，请申请人附上修改前后的对照页

审查员：董泽华

代码：

9302

THE PATENT OFFICE OF THE PEOPLE'S REPUBLIC OF CHINA

Address: 6 Xi Tu Cheng Lu, Haidian, Beijing Post Code: 100088

Applicant:	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	
Attorney:	LI DESHAN	Date of Notification:
Application No.:	03104463.8	Date: 23 Month: 03 Year: 2007
Title of the Invention:	COMPOUND OBJECTIVE LENS ... WITH THE BINARY FOCUS MICROSCOPE	

Notification of Third Office Action

1. ☒ The examiner received the response submitted by the applicant on Oct.10,2006 to the 2nd Office Action and further examination as to substance has been carried out on the above-identified patent application for invention on this new basis.
   ☐ According to the Reexamination Decision made by the Patent Reexamination Board of the Patent Office on _____ examination as to substance on the above-identified application has been resumed.

2. Further examination as to substance has been carried out based on the documents as specified below:
   ☐ The amended application documents attached to the response to the previous Office Action.
   ☒ The application documents based on which the previous examination was carried out and the substitution pages attached to the response to the previous Office Action.
   ☐ The application documents based on which previous examination was carried out.
   ☐ The application documents confirmed by the Reexamination Decision.

3. ☐ No further reference documents are cited in this Office Action.
   ☒ Below is/are the reference document(s) cited in this Notification:

No.	Number(s) or Title(s) of Reference(s)	Date of Publication (or the filing date of conflicting application)
1		Date: Month: Year:
2		Date: __ Month: __ Year: ____
3	US5227915A	Date: 13 Month: 7 Year: 1993
4		Date: __ Month: __ Year: ____
5		Date: __ Month: __ Year: ____

4. Conclusions of the Action:
   ☐ On the Specification:
   ☐ The amendments to the description do not comply with Article 33 of the Patent Law.
   ☐ The subject matter contained in the application is not patentable under Article 5 of the Patent Law.
   ☐ The description does not comply with Article 26 paragraph 3 of the Patent Law.
   ☐ The draft of the description does not comply with Rule 18 of the Implementing Regulations.

☒ On the Claims:
- ☐ The amendments to claims _____ do not comply with Article 33 of the Patent Law.
- ☐ Claim(s) _____ is/are not patentable under Article 25 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the definition of inventions prescribed by Rule 2 paragraph 1 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not possess the novelty as required by Article 22 paragraph 2 of the Patent Law.
- ☒ Claim(s) 1-9 does/do not possess the inventiveness as required by Article 22 paragraph 3 of the Patent Law.
- ☐ Claim(s) _____ does/do not possess the practical applicability as required by Article 22 paragraph 4 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with Article 26 paragraph 4 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with Article 31 paragraph 1 of the Patent Law.
- ☒ Claim(s) 1,4 does/do not comply with the provisions of Rules 20-23 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not comply with Article 9 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the provisions of Rule 12 paragraph 1 of the Implementing Regulations.

The detailed explanation of the above conclusions is set forth in the text portion of the Notification.

5. In view of the conclusions set forth above, the Examiner is of the opinion that:
   - ☐ The applicant should make amendments to the application documents as directed in the text portion of the Notification.
   - ☒ The applicant should expound in the response reasons why the application is patentable and make amendments to the application where there are deficiencies as pointed out in the text portion of the Notification, otherwise, the application will be rejected.
   - ☐ The application contains no allowable invention, and therefore, if the applicant fails to submit sufficient reasons to prove that the application does have merits, it will be rejected.
   - ☐

6. The followings should be taken into consideration by the applicant in making the response:
   (1) Under Article 37 of the Patent Law, the applicant should respond to the office action within 2 months counting from the date of receipt of the Notification. If, without any justified reason, the time limit is not met, the application shall be deemed to have been withdrawn.
   (2) Any amendments to the application should be in conformity with the provisions of Article 33 of the Patent Law. Substitution pages should be in duplicate and the format of the substitution should be in conformity with the relevant provision contained in "The Examination Guidelines".
   (3) The response to the Notification and/or revision of the application should be mailed to or handed over to the "Reception Division" of the Patent Office, and documents not mailed or handed over to the Reception Divisions have no legal effect.
   (4) Without an appointment, the applicant and/or his agent shall not interview with the Examiner in the Patent Office.

9. This Notification contains a text portion of 2 pages and the following attachments:
   ☒ 1 cited reference(s), totaling 9 pages. ☐

Examination Dept. _____ Examiner: _____ Seal of the Examination Department

Text of the Notification of the Third Office Action

CN Application No. 03104463.8

Claims 1 and 4 do not comply with Rule 21.2 of the IRCPL, because, if the light is a single-wavelength light, then the same one beam of light will not be converged on both the first information medium and the second information medium after passing through the second region. That is to say, a beam of light cannot have two different focal points after passing through the same region of the lens. Therefore, Claims 1 and 4 lack the essential technical feature concerning multi-wavelength light source. When the light source has multiple wavelengths, a corresponding wavelength of the light source must be selected according to the kind of the optical disk, thus selecting the wavelength of the light source based on the kind of the optical disk is an essential technical feature for solving the compatibility of multi-thickness information media. Therefore, Claims 1 and 4 lack the above technical features.

Even if the applicant amends the claims, the claims still have the defect of lacking inventiveness.

Claim 1 does not possess inventiveness. Reference 3 (US5227915A) has disclosed a diffractive optical element, in which (see from Column 1 Line 11 to Column 6 Line 61 of the description and Figs.1-5) the following contents have been revealed: a diffractive optical element (equivalent to the optical lens in Claim 1) suitable for optical disk scanning (see Column 1 Lines 11-21); the diffractive optical element has a first phase zone and second phase zone (respectively equivalent to the first region and second region of the optical lens); as shown in Fig.1, one side of the optical element has a curved surface shape, and the phase zones of the optical element transmit at least a part of light and mask out another part of light, based on a difference in phase (see Column 2 Lines 29-36); lasers of different wavelengths have different focal

points when passing through the optical element. Reference 3 has given a technical teaching of applying an optical element having double focal points to optical disk scanning, and Reference 2 has disclosed deciding the kind of the optical disk based on the amplitude of the RF signal and deciding the thickness of an unknown optical disk based on the amplitude of the RF signal (see the first Office Action). Given the technical teaching of Reference 3, it is obvious to obtain the technical solution of making information media of different thicknesses compatible using double focal points formed by the optical lens having two regions, by combining Reference 3 with Reference 2. Therefore, Claim 1 does not possess inventiveness as required by Article 22.3 of the CPL with respect to the combination of References 2 and 3. Claim 4 defines an apparatus completely corresponding to the method of Claim 1. Based on the comments on Claim 1, Claim 4 does not possess inventiveness as required by Article 22.3 of the CPL either.

The additional technical feature of Claim 2 is to perform focus control based on the kind of the information medium. Reference 2 has given the technical teaching of performing focus control based on the kind of the optical disk, thus performing focus control based on technical features of different optical disks is conventional technical means for those skilled in the art. Therefore, when Claim 1 referred to does not possess inventiveness, Claim 2 does not possess inventiveness as required by Article 22.3 of the CPL either. Due to the same reasons, Claim 6 does not possess inventiveness as required by Article 22.3 of the CPL either.

Claim 3 does not possess inventiveness either. Reference 2 has disclosed deciding the kind of the optical disk based on the amplitude AB of the RF signal. The kind of the optical disk indicates the thickness of the optical disk, i.e. the thickness of the transparent portion. Therefore, when Claim 1 referred to does not possess inventiveness, Claim 3 does not possess inventiveness as

required by Article 22.3 of the CPL either. Due to the same reasons, Claim 8 does not possess inventiveness as required by Article 22.3 of the CPL either.

Claim 5 does not possess inventiveness either. Reference 2 has disclosed the content of different thicknesses of the optical disks, and Fig.1 in Reference 3 has revealed dividing phase zones of the optical element depending on differences in a distance from the optical axis. Therefore, when Claim 4 referred to does not possess inventiveness, Claim 5 does not possess inventiveness as required by Article 22.3 of the CPL either. Due to the same reasons, Claims 7 and 9 do not possess inventiveness as required by Article 22.3 of the CPL either.

Due to the reasons above, the applicant shall submit observations or a newly amended application document within the time limit. According to Rule 18 of the IRCPL, when amending the claims, the applicant shall adapt the description, the accompanying drawings and the title of the invention to the new claims, and record the technical solutions(s) of the amended independent claim(s) into the part "Summary of the Invention" of the description. Since the above problems pointed out by the examiner belong to the circumstances that shall be rejected as provided in Rule 53 of the IRCPL, if the applicant fails to present convincing arguments but insists on making no amendments, the application will be rejected. The applicant shall make amendments as required by the notification and any voluntary amendment will render the document not to be rejected. The amendment shall be in line with Article 33 of the CPL and Rule 51 of the IRCPL.

Examiner: DONG Zehua

Code: 9302

CCPIT PATENT AND TRADEMARK LAW OFFICE

PATENT DEVELOPMENT INTERNATIONAL, INC.
PATENT AND TRADEMARKS
6TH TOMIZAWA BLDG, 3F
12-5, YOTSUYA 2-CHOME
SHINJUKU-KU, TOKYO 160-0004
JAPAN 日本

10/F, Ocean Plaza
158 Fuxingmennei Street,
Beijing 100031, China
Telephone: 86-10-66412345
Facsimile : 86-10-66415678
86-10-66413211
E-mail : mail@ccpit-patent.com.cn
Web site : www.ccpit-patent.com.cn

April 16, 2007

FAX No.: 0081333550115

Y/R: CN5-93124-SK-C
O/R: IIE030158
Re: Chinese Application for Invention No. 03104462.X
In the name of MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Title: COMPOUND OBJECTIVE LENS ... WITH THE BINARY FOCUS MICROSCOPE

Dear Sirs:

This is to report to you that we have received the third Office Action issued by the Chinese Patent Office on **March 23, 2007** in connection with the above-identified patent application. Enclosed please find a copy of the Office Action and the English translation thereof.

In the Office Action, the examiner objects to independent claims 1 and 3 as lacking support by the description and lacking essential features. In addition, the examiner cites References 2 and 3, and objects to claims 1-4 as lacking inventiveness.

After checking the file, we find that the examiner may have confused the captioned case with other divisional case(s) since the basis for examination appears wrong. Therefore, we contacted the examiner and the examiner acknowledged this. The examiner clarified that, his objection to claim 3 as lacking support and lacking essential features shall be disregarded, and his objection to claims 2-4 as lacking inventiveness shall also be disregarded.

Therefore, the applicant only needs to address the objections to claim 1.

Regarding the lack of support and lack of essential feature objections to claim 1, according to the examiner, the single-wavelength light source cannot be supported by the description, and in case of "multi-wavelength light source", the feature concerning "selection of the wavelength of the light source based on the kind of the optical disk" is indispensable.

We notice from your proposed arguments in response to the second Office Action that, it is the single-wavelength light source which is given as an example in the present application, but both the single-wavelength light source and the multi-wavelength light source may be employed in the present invention. Therefore, the examiner's objections can be argued. In this regard, your explanations in more detail would be highly appreciated.

As for the lack of inventiveness objection to claim 1, the applicant will need to analyze the differences between claim 1 and the references, and emphasize the advantageous technical effects produced by the distinguishing features.

Please note that a response to the Office Action is due on **May 23, 2007**. Your instructions given two weeks before the due date would be highly appreciated.

For your information, the applicant may request an extension of time only once (either one or two months) upon payment of extension fees. Since no further extension of time is permitted, it is advised that the applicant extend the time for two months if necessary.

If you have any questions concerning this matter, please feel free to let us know.

Sincerely yours,

Du Juan

CCPIT Patent and Trademark Law Office
Encl.: A copy of the Third Office Action and the English translation thereof

Notice
This firm will be closed from 11:30 of April 30, 2007 to May 7, 2007 for the Labour Day. We shall appreciate it if you could forward us papers to be filed during this period well before April 28, 2007.

中华人民共和国国家知识产权局

100037 北京市阜成门外大街2号万通新世界广场8层 中国国际贸易促进委员会专利商标事务所 李德山 72030158	发文日
申请号：03104462X	
申请人：松下电器产业株式会社	
发明名称：光学头装置和光盘装置	

专利局 2007.3.23 发文

第 3 次审查意见通知书

1. ☑审查员已收到申请人于2006年10月10日提交的意见陈述书，在此基础上审查员对上述专利申请继续进行实质审查。

☐根据国家知识产权局专利复审委员会于　　年　月　日作出的复审决定，审查员对上述专利申请继续实质审查。

☐_____

2. ☐申请人于　　年　月　日提交的修改文件，不符合专利法实施细则第51条第3款的规定。

3. 继续审查是针对下述申请文件进行的：

☐上述意见陈述书中所附的经修改的申请文件。

☑前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换页。

☐前次审查意见通知书所针对的申请文件。

☐上述复审决定所确定的申请文件。

☐_____

4. ☐本通知书未引用新的对比文件。

☑本通知书引用下述对比文件（其编号续前，并在今后的审查过程中继续沿用）：

编号	文件号或名称	公开日期（或抵触申请的申请日）
3	US5227915A	1993-7-13

5. 审查的结论性意见：

☐关于说明书：

☐申请的内容属于专利法第5条规定的不授予专利权的范围。

☐说明书不符合专利法第26条第3款的规定。

☐说明书的修改不符合专利法第33条的规定。

☐说明书的撰写不符合专利法实施细则第18条的规定。

☐_____

☑关于权利要求书：

☐权利要求_____不具备专利法第22条第2款规定的新颖性。

☑权利要求 1-4 不具备专利法第22条第3款规定的创造性。

☐权利要求_____不具备专利法第22条第4款规定的实用性。

☐权利要求_____属于专利法第25条规定的不授予专利权的范围。

☑权利要求 1、3 不符合专利法第26条第4款的规定。

☐权利要求_____不符合专利法第31条第1款的规定。

☐权利要求_____的修改不符合专利法第33条的规定。

☐权利要求_____不符合专利法实施细则第2条第1款的规定。

☐权利要求_____不符合专利法实施细则第13条第1款的规定。

中华人民共和国国家知识产权局 专利审查业务章 105

回函请寄：100088 北京市海淀区蓟门桥西土城路6号：国家知识产权局专利局受理处收
（注：凡寄给审查员个人的信函不具有法律效力）

☐权利要求_____不符合专利法实施细则第 20 条的规定。
☑权利要求 1、3 不符合专利法实施细则第 21 条的规定。
☐权利要求_____不符合专利法实施细则第 22 条的规定。
☐权利要求_____不符合专利法实施细则第 23 条的规定。
☐_____
☐分案的申请不符合专利法实施细则第 43 条第 1 款的规定。
上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见，审查员认为：
☐申请人应按照通知书正文部分提出的要求，对申请文件进行修改。
☑申请人应在意见陈述书中论述其专利申请可以被授予专利权的理由，并对通知书正文部分中指出的不符合规定之处进行修改，否则将不能授予专利权。
☐专利申请中没有可以被授予专利权的实质性内容，如果申请人没有陈述理由或者陈述理由不充分，其申请将被驳回。
☐_____

7. 申请人应注意下述事项：
(1) 根据专利法第 37 条的规定，申请人应在收到本通知书之日起的贰个月内陈述意见，如果申请人无正当理由逾期不答复，其申请将被视为撤回。
(2) 申请人对其申请的修改应符合专利法第 33 条和实施细则第 51 条的规定，修改文本应一式两份，其格式应符合审查指南的有关规定。
(3) 申请人的意见陈述书和/或修改文本应邮寄或递交国家知识产权局专利局受理处，凡未邮寄或递交给受理处的文件不具备法律效力。
(4) 未经预约，申请人和/或代理人不得前来国家知识产权局专利局与审查员举行会晤。

8. 本通知书正文部分共有 2 页，并附有下述附件：
☑引用的对比文件的复印件共 1 份 9 页。
☐_____

审查员：肇泽堂(9302)　　审查部门　审查协作中心
2007 年 2 月 9 日

回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号　国家知识产权局专利局受理处收
（注：凡寄给审查员个人的信函不具有法律效力）

第三次审查意见通知书正文

申请号：03104462X

权利要求1、3中利用单波长光束进行聚焦控制的技术方案得不到说明书的实质性支持，光源发射的光束可以是单波长也可以是多波长，当光源发出单一波长的光束时，同一束光通过透镜第二区域不可能既会聚于第一信息媒体又会聚于第二信息媒体，也就是说同一束光通过透镜第二区域不可能同时具有两个焦点，而且同一束光也不可能既通过透镜第一区域会聚于第一信息媒体又不通过透镜第一区域，因此权利要求1、3不符合专利法第二十六条第四款的规定。

权利要求1、3还不符合专利法第二十一条第二款的规定，当光源是多波长时，必须根据光盘的种类选择光源的波长，根据光盘的种类选择光源的波长是解决兼容多厚度信息媒体的必要技术特，权利要求1、3缺少该特征。

即使申请人修改了权利要求书，克服了上述缺陷，权利要求书还存在如下缺陷：

权利要求1还存在不具有创造性的缺陷，对比文件2（EP0539019A1）公开了一种光盘装置中的聚焦伺服设备，其中（说明书第3栏第12行至第9栏第21行）披露了以下内容：聚焦误差检测装置4检测从光盘表面返回的光信息，根据检测到的RF信号的最大值A和最小值B来判别光盘2的种类，进而根据判定的光盘的种类进行相应种类的光盘的聚焦伺服，而根据聚焦误差信号和光学信息记录介质和物镜之间的距离的关系进行聚焦控制是本领域常用技术手段。权利要求1和对比文件2的区别在于光学透镜的结构，也就是物镜的结构，对比文件3（US5227915A）公开了一种衍射光学元件，其中（具体参见说明书第1栏第11行至第6栏第61行以及附图1－5）披露了以下内容：衍射光学元件（对应权利要求1中的光学透镜）适用于光盘扫描（第1栏第11－21行），衍射光学元件具有第一相位区第二相位区（分别对应光学透镜的第一区域和第二区域），如图1所示，光学元件的一侧具有曲面形状，所述光学元件的相位区域更具相位的差异使至少一部分光通过而屏蔽另一部分光（第2栏第29－36行），必然使不同的波长的激光在通过该光学元件时具有不同的焦点。对比文件3给出了将具有双焦点的光学元件用于光盘扫描的技术启示，在对比文件2的技术基础上，根据对比文件3的技术启示，将对比文件2和3结合起来从而得到利用具有两个区域的光学透镜形成的双焦点兼容不同厚度的信息媒体的技术方案是显而易见的，所以相对比文件2和3的结合，权利要求1不具有专利法第二十二条第三款规定的创造性。权利要求3要求保护和权利要求1要求保护的方法完全对应的装置，基于评述权利要求1的理由，同理，权利要求3也不具有专利法第二十二条第三款规定的创造性。

权利要求2的附加技术特征是根据和信号进行聚焦误差控制，然而利用和信号进行

聚焦误差控制是本领域常用的技术手段，当其引用的权利要求不具有创造性时，权利要求2也不具有专利法第二十二条第三款规定的创造性，同理，权利要求4也不具有专利法第二十二条第三款规定的创造性。

针对上述审查意见，申请人应该在指定的期限内进行意见陈述或提交新修改的申请文件，注意修改权利要求书时，应该进行前后一致性修改，根据专利法实施细则第十八条对说明书及其附图作适应性修改，包括发明名称，将修改后的独立权利要求的技术方案记载到说明书的技术方案部分，说明书和权利要求书应该进行一致性修改。由于上述审查意见中指出的问题有的属于专利法实施细则第五十三条规定的驳回情形，因此如果申请人坚持现申请文本不作修改而又不能在意见陈述书中充分论述其符合专利法及其实施细则相关规定的理由，本申请将被驳回；申请人应该按照通知书的要求的进行修改，主动修改将会导致文本不予接受；任何修改都必须符合专利法第三十三条以及实施细则第五十一条之规定，根据专利法实施细则第五十二条的规定，请申请人附上修改前后的对照页。

审查员：董泽华

代码：9302

THE PATENT OFFICE OF THE PEOPLE'S REPUBLIC OF CHINA

Address: 6 Xi Tu Cheng Lu, Haidian, Beijing Post Code: 100088

Applicant:	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	
Attorney:	LI DESHAN	Date of Notification:
Application No.:	03104462.X	Date: 23 Month: 03 Year: 2007
Title of the Invention:	COMPOUND OBJECTIVE LENS ... WITH THE BINARY FOCUS MICROSCOPE	

Notification of Third Office Action

1. ☒ The examiner received the response submitted by the applicant on **Oct.10,2006** to the **2nd** Office Action and further examination as to substance has been carried out on the above-identified patent application for invention on this new basis.
   ☐ According to the Reexamination Decision made by the Patent Reexamination Board of the Patent Office on _____ examination as to substance on the above-identified application has been resumed.

2. Further examination as to substance has been carried out based on the documents as specified below:
   ☐ The amended application documents attached to the response to the previous Office Action.
   ☒ The application documents based on which the previous examination was carried out and the substitution pages attached to the response to the previous Office Action.
   ☐ The application documents based on which previous examination was carried out.
   ☐ The application documents confirmed by the Reexamination Decision.

3. ☐ No further reference documents are cited in this Office Action.
   ☒ Below is/are the reference document(s) cited in this Notification:

No.	Number(s) or Title(s) of Reference(s)	Date of Publication (or the filing date of conflicting application)
1		Date: __ Month: __ Year: ____
2		Date: __ Month: __ Year: ____
3	US5227915A	Date: 13 Month: 7 Year: 1993
4		Date: __ Month: __ Year: ____
5		Date: __ Month: __ Year: ____

4. Conclusions of the Action:
   ☐ On the Specification:
   ☐ The amendments to the description do not comply with Article 33 of the Patent Law.
   ☐ The subject matter contained in the application is not patentable under Article 5 of the Patent Law.
   ☐ The description does not comply with Article 26 paragraph 3 of the Patent Law.
   ☐ The draft of the description does not comply with Rule 18 of the Implementing Regulations.

☒ On the Claims:
- ☐ The amendments to claims _____ do not comply with Article 33 of the Patent Law.
- ☐ Claim(s) _____ is/are not patentable under Article 25 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the definition of inventions prescribed by Rule 2 paragraph 1 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not possess the novelty as required by Article 22 paragraph 2 of the Patent Law.
- ☒ Claim(s) 1-4 does/do not possess the inventiveness as required by Article 22 paragraph 3 of the Patent Law.
- ☐ Claim(s) _____ does/do not possess the practical applicability as required by Article 22 paragraph 4 of the Patent Law.
- ☒ Claim(s) 1,3 does/do not comply with Article 26 paragraph 4 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with Article 31 paragraph 1 of the Patent Law.
- ☒ Claim(s) 1,3 does/do not comply with the provisions of Rules 20-23 of the Implementing Regulations.
- ☐ Claim(s) _____ does/do not comply with Article 9 of the Patent Law.
- ☐ Claim(s) _____ does/do not comply with the provisions of Rule 12 paragraph 1 of the Implementing Regulations.

The detailed explanation of the above conclusions is set forth in the text portion of the Notification.

5. In view of the conclusions set forth above, the Examiner is of the opinion that:
- ☐ The applicant should make amendments to the application documents as directed in the text portion of the Notification.
- ☒ The applicant should expound in the response reasons why the application is patentable and make amendments to the application where there are deficiencies as pointed out in the text portion of the Notification, otherwise, the application will be rejected.
- ☐ The application contains no allowable invention, and therefore, if the applicant fails to submit sufficient reasons to prove that the application does have merits, it will be rejected.
- ☐

6. The followings should be taken into consideration by the applicant in making the response:
(1) Under Article 37 of the Patent Law, the applicant should respond to the office action within 2 months counting from the date of receipt of the Notification. If, without any justified reason, the time limit is not met, the application shall be deemed to have been withdrawn.
(2) Any amendments to the application should be in conformity with the provisions of Article 33 of the Patent Law. Substitution pages should be in duplicate and the format of the substitution should be in conformity with the relevant provision contained in "The Examination Guidelines".
(3) The response to the Notification and/or revision of the application should be mailed to or handed over to the "Reception Division" of the Patent Office, and documents not mailed or handed over to the Reception Divisions have no legal effect.
(4) Without an appointment, the applicant and/or his agent shall not interview with the Examiner in the Patent Office.

9. This Notification contains a text portion of 2 pages and the following attachments:
☒ 1 cited reference(s), totaling 9 pages. ☐

Examination Dept. _____ Examiner: _____ Seal of the Examination Department

Text of the Notification of the Third Office Action

CN Application No. 03104462.X

The technical solutions of claims 1 and 3 which use single-wavelength light beam to perform focus control cannot be supported by the description in substance. The light beam emitted by the light source may be of single-wavelength or of multi-wavelength. When the light source emits a single-wavelength light beam, then it is impossible for the same one beam of light to converge on both the first information medium and the second information medium after passing through the second region of the lens. That is to say, the same one beam of light cannot have two focal points after passing through the second region of the lens, and it is also impossible for the same one beam of light to pass through the first region of the lens to converge on the first information medium while not passing through the first region of the lens. Therefore, claims 1 and 3 do not conform to Article 26.4 of the Chinese Patent Law (CPL).

Claims 1 and 3 do not comply with Rule 21.2 of the IRCPL, either. When the light source has multiple wavelengths, the wavelength of the light source must be selected according to the kind of the optical disk, and selecting the wavelength of the light source based on the kind of the optical disk is an essential technical feature for solving the compatibility of multi-thickness information media. Claims 1 and 3 lack the above technical features.

Even if the applicant amends the claims to overcome the above defects, the claims still have the following defects.

Claim 1 also has the defect of lacking inventiveness. Reference 2(EP0539019A1) discloses a focus servo device in an optical disk apparatus,

wherein (see Column 3 Line 12 to Column 9 Line 21) the following contents are disclosed: focus error detecting means 4 detects the light information returned from the surface of the optical disk, determines the kind of the optical disk 2 according to the maximum A and minimum B of the detected RF signal, and performs focus servo of the optical disk according to determined kind of optical disk. Performing focus servo control based on focus error signal and the distance between the optical information recording medium and the object lens is commonly used technical means in the art. Claim 1 differs from Reference 2 in the structure of the optical lens, i.e., the structure of the object lens. Reference 3 (US5227915A) has disclosed a diffractive optical element, in which (see from Column 1 Line 11 to Column 6 Line 61 of the description and Figs.1-5) the following contents have been revealed: a diffractive optical element (equivalent to the optical lens in Claim 1) suitable for optical disk scanning (see Column 1 Lines 11-21); the diffractive optical element has a first phase zone and second phase zone (respectively equivalent to the first region and second region of the optical lens); as shown in Fig.1, one side of the optical element has a curved surface shape, and the phase zones of the optical element transmit at least a part of light and mask out another part of light, based on a difference in phase (see Column 2 Lines 29-36), causing lasers of different wavelengths have different focal points when passing through the optical element. Reference 3 has given a technical inspiration of applying an optical element having double focal points to optical disk scanning, and based on Reference 2, given the teaching of Reference 3, it is obvious to obtain the technical solution of making information media of different thicknesses compatible using double focal points formed by the optical lens having two regions, by combining Reference 3 with Reference 2. Therefore, Claim 1 does not possess inventiveness as required by Article 22.3 of the CPL with respect to the combination of References 2 and 3. Claim 3 claims an apparatus completely corresponding to the method as claimed in Claim 1. Based on the comments on Claim 1, Claim 3 does not possess inventiveness

as required by Article 22.3 of the CPL either.

The additional technical feature of Claim 2 is to perform focus error control based on the sum signal. However, performing focus error control based on the sum signal is commonly used technical means in the art. Therefore, when Claim 1 referred to does not possess inventiveness, Claim 2 does not possess inventiveness as required by Article 22.3 of the CPL either. Due to the same reasons, Claim 4 does not possess inventiveness as required by Article 22.3 of the CPL either.

Due to the reasons above, the applicant shall submit observations or a newly amended application document within the time limit. According to Rule 18 of the IRCPL, when amending the claims, the applicant shall adapt the description, the accompanying drawings and the title of the invention to the new claims, and record the technical solutions(s) of the amended independent claim(s) into the part "Summary of the Invention" of the description. Since the above problems pointed out by the examiner belong to the circumstances that shall be rejected as provided in Rule 53 of the IRCPL, if the applicant fails to present convincing arguments but insists on making no amendments, the application will be rejected. The applicant shall make amendments as required by the notification and any voluntary amendment will render the document not to be accpted. The amendment shall be in line with Article 33 of the CPL and Rule 51 of the IRCPL.

Examiner: DONG Zehua

Code: 9302

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : 0 539 019 A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number : 92308504.7

(51) Int. Cl.[5] : G11B 7/09

(22) Date of filing : 17.09.92

(30) Priority : 24.09.91 JP 272073/91

(43) Date of publication of application :
28.04.93 Bulletin 93/17

(84) Designated Contracting States :
DE FR GB

(71) Applicant : SONY CORPORATION
7-35, Kitashinagawa 6-chome Shinagawa-ku
Tokyo (JP)

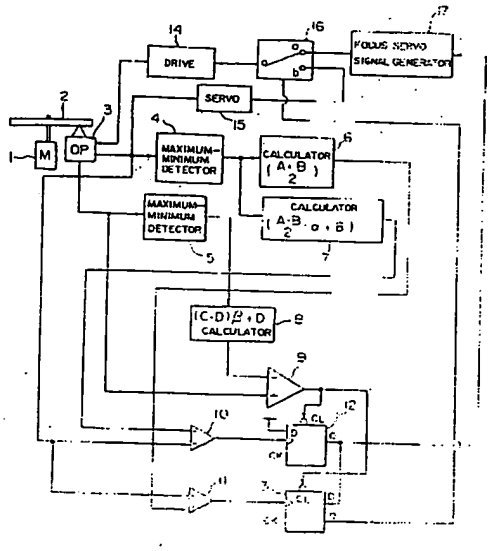
(72) Inventor : Wachi, Shigeaki
c/o 7-35 Kitashinagawa 6-chome
Shinagawa-ku, Tokyo (JP)

(74) Representative : Nicholls, Michael John
J.A. Kemp & Co., 14, South Square, Gray's Inn
London WC1R 5LX (GB)

(54) Focusing servo apparatus for an optical disc.

(57) A focus servo device for use in an optical disk apparatus. The device comprises a reproducer for irradiating a light beam emitted from a light source to an optical disk through an objective lens, and detecting an RF signal from a focus error signal on the basis of the return light beam reflected from the optical disk; a maximum-minimum detector for detecting the maximum and the minimum of the RF signal obtained from the reproducer; and a control signal generator for generating a focus servo signal obtained from the reproducer and also with the maximum and the minimum of the RF signal detected by the maximum-minimum detector. Since the focus servo lock-in control is performed in conformity with the detected maximum and minimum values of the reproduced RF signal, the apparatus is capable of recording information on and/or reproducing the same from any optical disk regardless of the kind thereof.

FIG. 3



EP 0 539 019 A1

The present invention relates to an optical disk apparatus for recording information on and/or reproducing the same from an optical disk, a magneto-optical disk or the like where information is optically recordable and reproducible. And more particularly it relates to a focus servo device employed in such an optical disk apparatus.

In the accompanying drawings Fig. 1 is a block diagram of an exemplary constitution for executing a control operation to lock in a focus servo device in a conventional magneto-optical disk apparatus. A first comparator 21 compares a focus error signal, which is based on a detection output from an optical pickup, with a predetermined first reference level refl and generates a high-level comparison output if the result of such comparison signifies that the focus error signal is greater. A second comparator 22 compares the focus error signal with a zero signal level and generates a high-level comparison output if the result of the comparison signifies that the focus error signal is greater. Meanwhile a third comparator 23 compares an RF signal with a predetermined second reference signal level ref2 and generates a high-level comparison output if the RF signal is greater.

An output terminal of the first comparator 21 is connected to a clock terminal CK of a first latch circuit 24, and a high-level state of the signal being applied to an input terminal D thereof is latched every time the output of the first comparator 21 is turned to a high level. Then such high-level state of the signal is delivered from an output terminal Q of the first latch circuit 24. An output terminal of the second comparator 22 is connected to a clock terminal CK of a second latch circuit 25 and, every time the output of the second comparator 22 is turned to a high level, a high-level or low-level state of the signal being applied from the output terminal of the first latch circuit 24 to the input terminal D of the second latch circuit 25 is latched and then is delivered from its output terminal Q. Reset terminals CLR of the first and second latch circuits 24, 25 are connected to an output terminal of the third comparator 23. And when the output of the third comparator 23 is turned to a low level, the first and second latch circuits 24, 25 are cleared so that outputs thereof are turned to a low level.

In the magneto-optical disk apparatus of the constitution mentioned, the focus servo lock-in control is performed in the following procedure. After a magneto-optical disk (not shown) is loaded in a recording and/or playback unit in the magneto-optical disk apparatus, a light beam is irradiated from an optical pickup (not shown) to the magneto-optical disk. Then in the disk apparatus, an objective lens incorporated in the optical pickup is displaced from a far position to a near position with respect to the magneto-optical disk, and a focus error signal is generated in accordance with the output signal of a photo detector obtained by an astigmatic method through a cylindrical lens which is disposed in the optical path of the reflected light beam from the magneto-optical disk to the photo detector. The relationship between the focus error signal and the distance from the objective lens to the magneto-optical disk is represented by an S curve as shown graphically in Fig. 2. (The astigmatic method is disclosed in, for example, U.S. Patent 4,023,033.)

Subsequently in the first comparator 21, the focus error signal thus generated is compared with a predetermined first signal level refl which is lower than the zero signal level (below the zero level in Fig. 2) and, when the result of such comparison signifies that the focus error signal is greater, the output of the first comparator 21 is turned to a high level. Therefore the clock terminal CK of the first latch circuit 24 is turned to a high-level state, and the input terminal of the first latch circuit 24 at that moment is also turned to a high-level state, whereby the output terminal of the first latch circuit 24 is turned to a high-level state. In response to such inversion of the output terminal of the first latch circuit 24 to a high-level state, the objective lens is displaced at a low speed under control with respect to a focus actuator (not shown) incorporated in the optical pickup. More specifically, a low-speed displacement of the objective lens is executed under control in the vicinity of a point where the focus error signal becomes coincident with a zero level (i.e., in the vicinity of a point P_1 on the S curve of Fig. 2).

In the second comparator 22, its output terminal is turned to a high-level state when the result of the comparison signifies that the focus error signal is coincident with the zero signal level. Consequently the clock terminal of the second latch circuit 25 is turned to a high-level state. Since the output terminal of the first latch circuit 24 is connected to the input terminal of the second latch circuit 25, the input terminal of the second latch circuit 25 is turned to a high-level state at that moment, whereby the output thereof is turned also to a high level. In response to such inversion of the output of the second latch circuit 25 to a high-level state, a loop switch of an unshown focus servo circuit is turned on so that an operation for focus servo lock-in control is performed.

The above operation is performed in a state where the output terminal of the third comparator 23, and consequently the reset terminals of both the first and second latch circuits 24, 25, have been turned to a high-level state after the RF signal compared with a predetermined second signal level ref2 in the third comparator 23 is judged to be greater. Namely, the focus servo lock-in control action is executed when the reflected light beam (corresponding to the RF signal) of the initial beam irradiated from the optical pickup to the magneto-optical disk has a sufficient intensity greater than a predetermined value (corresponding to the signal level ref2).

Thus, in the conventional focus servo device, its

operation for focus servo lock-in control is performed if the results of the comparisons signify that the focus error signal is coincident with the predetermined zero signal level and that the RF signal is greater than the predetermined signal level. Therefore, in recording information on and/or reproducing the same from a magneto-optical disk which has a recording layer of a small reflectivity, the RF signal level fails to reach the predetermined signal level to eventually raise a problem that the proper operation for focus servo lock-in control is not achievable.

In view of the circumstances mentioned, it is an object of the present invention to provide an improved focus servo device capable of performing, in an optical disk apparatus, a stable operation for focus servo lock-in control regardless of the kind of any optical disk loaded therein.

According to one aspect of the present invention, there is provided a focus servo device employed in an optical disk apparatus and comprising playback means for irradiating a light beam emitted from a light source to an optical disk through an objective lens, and detecting an RF signal and a focus error signal on the basis of the return light beam reflected from the optical disk; maximum-minimum detector means for detecting the maximum and the minimum of the RF signal obtained from the playback means; and control signal generator means for generating a focus servo control signal in conformity with the focus error signal obtained from the playback means and also with the maximum and the minimum of the RF signal detected by the maximum-minimum detector means.

In the above constitution, the operation for focus servo lock-in control is performed in conformity with the detected maximum and minimum values of the RF signal. Therefore it becomes possible to realize an improved apparatus which is capable of properly recording and/or recording information regardless of the kinds of optical disks having mutually different reflectivities or transmissivities to light.

The present invention will be further described by way of non-limitative example in the following description which will be given with reference to the illustrative accompanying drawings, in which:-

Fig. 1 is a block diagram of an exemplary constitution for executing a control operation to lock in a focus servo device in a conventional magneto-optical disk apparatus;

Fig. 2 graphically shows the relationship between an RF signal and a distance from a magneto-optical disk to an objective lens incorporated in an optical pickup employed in Fig. 3;

Fig. 3 is a block diagram showing a constitution of an exemplary magneto-optical disk apparatus to which the present invention is applied; and

Fig. 4 graphically shows the relationship between a focus error signal and a distance from a magneto-optical disk to an objective lens incorporated in an optical pickup employed in Fig. 3.

Fig. 3 is a block diagram of an optical disk apparatus with a focus servo device of the present invention, wherein reference numeral 1 denotes a spindle motor for rotating a magneto-optical disk 2 at a fixed linear or angular velocity. The magneto-optical disk 2 is composed of a substrate having a high transmissivity to light and a recording layer of a selected material suited for magneto-optically recording information on and/or reproducing the same from a plurality of record tracks. Denoted by 3 is an optical pickup which consists of a light source with a laser diode; an objective lens for focusing a light beam emitted from the laser diode onto the recording layer on the magneto-optical disk 2; a focus actuator for driving the objective lens in parallel with the optical axis of the lens; a photo diode serving as a photo detector with a plurality of light receiving surfaces to receive, through the objective lens, the return light beam reflected from the magneto-optical disk 2; a beam splitter for splitting the input into the light beam emitted from the laser diode and the return light beam reflected from the magneto-optical disk 2; and an optical element such as a cylindrical lens disposed in the optical path of the return light beam between the beam splitter and the photo detector and capable of generating an astigmatism for detection of the focus error. The optical pickup 3 is displaced in the diametrical direction of the magneto-optical disk by an unshown pickup feed mechanism and serves to irradiate the light beam, which is in a state focused through the objective lens, from the laser diode onto a desired record track on the magneto-optical disk. The detection output of the photo diode in the optical pickup 3 is supplied to an unshown matrix circuit, so that there is obtained a reproduced RF signal from the magneto-optical disk 2 corresponding to the sum of the detection outputs from the individual light receiving surfaces of the photo diode, and there is also obtained a focus error signal corresponding to the difference between the detection outputs of the individual light receiving surfaces of the photo diode based on the return light beam received from the magneto-optical disk 2 through the optical element which generates the astigmatism of the optical pickup 3 in relation to the surface deflection of the magneto-optical disk 2.

A focus error maximum-minimum detector 4 detects the maximum (A) and the minimum (B) of the focus error signal obtained from the output signal of the optical pickup 3. Similarly, an RF signal maximum-minimum detector 5 detects the maximum (C) and the minimum (D) of the RF signal obtained from the output signal of the optical pickup 3.

A first calculator 6 calculates an average ((A+B)/2) of the maximum (A) and the minimum (B) of the focus error signal detected by the maximum-minimum detector 4. Meanwhile a second calculator 7 multiplies, by a predetermined positive coefficient

α smaller than 1, a half of the peak-to-peak value (difference between the maximum and the minimum) obtained from the maximum (A) and the minimum (B) of the focus error signal detected by the maximum-minimum detector 4, and then adds the minimum to the result of such multiplication to thereby calculate ((A-B)/2 x α + B).

A third calculator 8 multiplies, by a predetermined positive coefficient β smaller than 1, the peak-to-peak value obtained from the maximum (C) and the minimum (D) detected by the maximum-minimum detector 5, and then adds the minimum to the result of such multiplication to thereby calculate ((C-D) x β + D).

A first comparator 9 compares the RF signal with the value obtained from the third calculator 8 and generates a high-level output signal if the result of such comparison signifies that the RF signal is greater, or generates a low-level signal if the RF signal is smaller. A third comparator 11 compares the focus error signal with the value obtained from the first calculator 6 and generates a high-level output signal if the result of the comparison signifies that the focus error signal is greater, or generates a low-level output signal if the focus error signal is smaller. Meanwhile a second comparator 10 compares the focus error signal with the value obtained from the second calculator 7 and generates a high-level output signal if the result of the comparison signifies that the focus error signal is greater, or generates a low-level output signal if the focus error signal is smaller.

An output terminal of the second comparator 10 is connected to a clock terminal CK of a first latch circuit (D-FF) 12, and every time the output of the second comparator 10 is turned to a high level, the high-level state of the signal being applied to its input terminal D is latched, and then a high-level state of the signal is delivered from its output terminal Q. An output terminal of the third comparator 11 is connected to a clock terminal CK of a second latch circuit (D-FF) 13, and every time the output of the third comparator 11 is turned to a high level, a high-level or low-level state of the signal obtained from the output terminal of the first latch circuit 12 and supplied to the input terminal D of the second latch circuit 13 is latched and then is delivered from its output terminal Q. Reset terminals CLR of the first and second latch circuits 12, 13 are connected to the output terminal of the first comparator 9, and when the output of the first comparator 9 is turned to a low level, the first and second latch circuits 12, 13 are cleared so that the outputs thereof are turned to a low level.

There are further shown a driver 14 for driving the focus actuator in the optical pickup 3; a servo circuit 15 for generating a focus servo signal in accordance with the focus error signal from the optical pickup 3 and supplies such focus servo signal to the driver 14; a switch circuit 16 changed under control selectively in response to a control signal from an unshown system controller and the output signal from the second latch circuit 13; and a focus search signal generator 17 for supplying a focus search signal to the focus actuator in the optical pickup 3 in response to the control signal from the system controller, so as to displace the objective lens in a focusing direction perpendicular to the plane of the magneto-optical disk. In the focus search signal generator 17, the focus search signal is controlled in accordance with the output signal from the first latch circuit 12, thereby controlling the displacement speed of the objective lens.

At the start of the focus servo lock-in operation, the switch circuit 16 is connected to a contact a in response to the control signal obtained from the system controller, so that the focus search signal from the focus search signal generator 17 is supplied to the focus actuator in the optical pickup 3. Thereafter the connection of the switch circuit 16 is changed from the contact a to the other contact b in response to the output signal from the second latch circuit 13, so that the focus error signal is supplied to the focus actuator in the optical pickup 3 to thereby execute the focus servo control action. Then the output from the second latch circuit 13 is supplied to the aforementioned system controller, so that the control signal is supplied therefrom to the focus search signal generator 17, whereby generation of the focus search signal is brought to a halt.

In the present invention, although not shown, an external-field generating magnetic head is provided at the opposite position of the optical pickup 3 with respect to the magneto-optical disk 2, so as to record the information signal in cooperation with the optical pickup 3. Therefore, when any desired information is to be recorded on the magneto-optical disk 2, the light beam of a recording power level is irradiated from the optical pickup 3 to one side of the recording layer adjacent to the substrate of the disk, while a perpendicular external magnetic field is applied from the magnetic head disposed on the other side of the recording layer of the magneto-optical disk 2, whereby the information can be recorded on the disk 2.

Now a description will be given on how the operation is performed to execute the focus servo lock-in control. After the magneto-optical disk 2 is loaded in the recording and/or playback unit in the disk apparatus, the motor 2 is so controlled as to rotate the loaded magneto-optical disk 2 at a predetermined rate. Then the light beam emitted from the laser diode incorporated in the optical pickup 3 is irradiated to the magneto-optical disk 2, and the return light beam reflected from the magneto-optical disk 2 is received by the photo detector. An astigmatism generating optical element such as a cylindrical lens is disposed in the optical path of the reflected light beam between the objective lens and the photo detector of the optical pickup 3, and a sawtooth driving signal is supplied

from the focus search signal generator 17 to the focus actuator in the optical pickup 3 in a manner to repeat the focus search operation which displaces the objective lens in the optical pickup 3 from a far position to a near position with respect to the magneto-optical disk 2. An RF signal is reproduced from the magneto-optical disk 2 on the basis of the detection output from the photo detector in the optical pickup 3, and also a focus error signal is generated by the astigmatic method on the basis of the detection output from the photo detector in the optical pickup 3. The focus error signal and the RF signal thus obtained are supplied to the maximum-minimum detectors 4, 5 respectively, so that the maximum (A) and the minimum (B) of the focus error signal are detected by the maximum-minimum detector 4, while the maximum (C) and the minimum (D) of the RF signal are detected by the maximum-minimum detector 5.

After detection of the maximum and the minimum of the focus error signal by the maximum-minimum detector 4, an average ((A + B)/2) thereof is calculated by the first calculator 6. The average thus obtained corresponds to a point P_1 (focus zero-crossing point) on the S curve of Fig. 2 which represents the relationship between the focus error signal and the distance from the magneto-optical disk 2 to the objective lens in the optical pickup 3. When the focus error signal is equal to such average, the focal point of the light beam irradiated from the optical pickup 3 is coincident with the position of the magneto-optical disk 2. Meanwhile the second calculator 7 multiplies, by a predetermined positive coefficient α smaller than 1, a half of the peak-to-peak value, i.e., the difference between the maximum (A) and the minimum (B) of the focus error signal detected by the maximum-minimum detector 4, and then adds the minimum level to the result of such multiplication to thereby calculate ((A - B)/2 x α + B). The value thus obtained corresponds to a point P_2 on the S curve shown in Fig. 2.

Further the third calculator 8 multiplies, by a predetermined positive coefficient β smaller than 1, the peak-to-peak value relative to the maximum (C) and the minimum (D) of the RF signal detected by the maximum-minimum detector 5, and then adds the minimum to the result of such multiplication to thereby calculate ((C - D) x β + D). The value thus obtained corresponds to a point P_3 on the curve of Fig. 4 which represents the relationship between the RF signal and the distance from the magneto-optical disk 2 to the objective lens incorporated in the optical pickup 3.

After the predetermined calculations are executed in the first, second and third calculators 6 through 8 as described, the RF signal generated on the basis of the detection output from the optical pickup 3 is compared in the first comparator 9 with the value calculated in the third calculator 8 (the RF signal level corresponding to the point P_3 in Fig. 4). And if the result of such comparison signifies that the RF signal is greater, the output of the first comparator 9 is turned to a low level. Meanwhile, if the result signifies that the RF signal is smaller, the output of the first comparator 9 is turned to a low level. And such output is supplied to the reset terminals CL of both the first and second latch circuits 12, 13. Therefore, when the signal generated on the basis of the detection output from the optical pickup 3 is judged to be greater than the value calculated by the second calculator 8 (the RF signal level corresponding to the point P_3 in Fig. 4), the first and second latch circuits 12, 13 are placed in an operable state (where the level of the signal being supplied to the input terminals D is latched at the moment the signal is inputted to the clock terminals CK, and the level of such signal can be delivered from the output terminals Q).

Subsequently in the second comparator 10, the focus error signal is compared with the value calculated by the third calculator 7 (the focus error signal level corresponding to the point P_2 in Fig. 4). And if the result of such comparison signifies that the focus error signal level is greater, the output of the second comparator 10 is turned to a high level, so that the clock terminal CK of the first latch circuit 12 is turned to a high-level state, and further the input terminal D of the first latch circuit 12 is turned also to a high-level state at that moment, whereby the output terminal Q thereof is turned to a high-level state. In response to such inversion of the output of the first latch circuit 12 to a high level, a control operation is performed for the focus actuator in the optical pickup 2 in such a manner as to displace the objective lens at a low speed. More specifically, the objective lens is displaced at a low speed in case the focus error signal is judged to be greater than the value corresponding to the point P_2 on the S curve shown in Fig. 4.

Further in the third comparator 11, the focus error signal is compared with the value calculated by the first calculator 6 (the focus error signal level corresponding to the point P_1 in Fig. 4). And if the result of such comparison signifies that the focus error signal is greater, the output of the first comparator 11 is turned to a high level, so that the clock terminal CK of the second latch circuit 13 is turned to a high level state. Since the input terminal of the second latch circuit 13 is connected to the output terminal of the first latch circuit 12, the input of the second latch circuit 13 at that moment is turned to a high level state, so that the output thereof is turned also to a high level. In response to such inversion of the output of the second latch circuit 13 to a high level, a control operation is performed for the focus actuator in such a manner as to halt its drive of the objective lens in a low-speed displacement while turning on the focus servo switch by selectively changing the connection of the switch circuit 16 from the contact a to the contact b. More specifically, when the focus error signal is judged to

be equal to the value corresponding to the point P_1 on the S curve shown in Fig. 4, the control operation for locking in the focus servo is performed by switching the displacement of the objective lens to the focus servo action based on the focus error signal.

Thus, in the focus servo device employed in the optical disk apparatus of the present invention, the focus servo lock-in control operation is performed in conformity with the maximum and the minimum of the RF signal, hence enabling the apparatus to record or reproduce information on or from any of two or more kinds of optical disks, magneto-optical disks and so forth having mutually different reflectivities.

According to the present invention, as described hereinabove, the maximum and the minimum of the RF signal are detected, and the focus servo lock-in control is executed in conformity with the detected values. Consequently it becomes possible to realize an improved apparatus capable of recording information on and/or reproducing the same from any optical disk regardless of the kind thereof.

Claims

1. A focus servo device for use in an optical disk apparatus, comprising:

   reproducer means (3) for irradiating a light beam emitted from a light source to an optical disk (2) through an objective lens, and detecting an RF signal and a focus error signal on the basis of the return light beam reflected from said optical disk (2);

   control signal generator means (4,6-17) for generating a focus servo control signal in conformity with the focus error signal obtained from said reproducer means; characterised by:

   maximum-minimum detector means (5) for detecting the maximum and the minimum of the RF signal obtained from said reproducer means (3); and in that

   the control signal generator means (4,6-17) generates the focus servo control signal also in accordance with the maximum and the minimum of the RF signal detected by said maximum-minimum detector means (5).

2. The focus servo device according to claim 1, wherein said control signal generator means (4,6-17) has focus error signal maximum-minimum detector means (4) for detecting the maximum and the minimum of the focus error signal; calculator means (6,7) for executing predetermined calculations relative to the output signal of said focus error signal maximum-minimum detector means (4); and comparator means (10,11) for comparing the output signal of said calculator means (6,7) with the focus error signal.

3. The focus servo device according to claim 2, wherein said calculator means consists of a first calculator (6) for calculating an average of the maximum and the minimum of the focus error signal obtained from said focus error signal maximum-minimum detector means (4); and a second calculator (7) for multiplying, by a predetermined coefficient, a half of the difference between the maximum and the minimum of the focus error signal obtained from said focus error signal maximum-minimum detector means (4), and adding the minimum to the result of such multiplication.

4. The focus servo device according to claim 2 or 3, wherein said control signal generator means (4,6-17) has control means for generating said control signal on the basis of both the output signal of said RF signal maximum-minimum detector means (5) and the output signal of said comparator means (10,11).

5. The focus servo device according to claim 4, wherein said control signal generator means (4,6-17) has another calculator means (8) for executing a predetermined calculation relative to the output signal from said RF signal maximum-minimum detector means (5).

6. The focus servo device according to claim 5, wherein said another calculator means (8) multiplies, by a predetermined coefficient, the difference between the maximum and the minimum of the reproduced signal from said RF signal maximum-minimum detector means (5), and then adds the minimum to the result of such multiplication.

7. The focus servo device according to any one of the preceding claims, wherein said control signal generator means (4,6-17) has control means (12) for producing a control signal to lower the displacement speed of said objective lens in said reproducer means (3) on the basis of the focus error signal and the output signal from said RF signal maximum-minimum detector means (5).

8. The focus servo device according to claim 7, wherein said control means is for producing said control signal on the basis of the output signal from said RF signal maximum-minimum detector means (5) and also the output signal from said calculator means (6,7).

FIG. 1

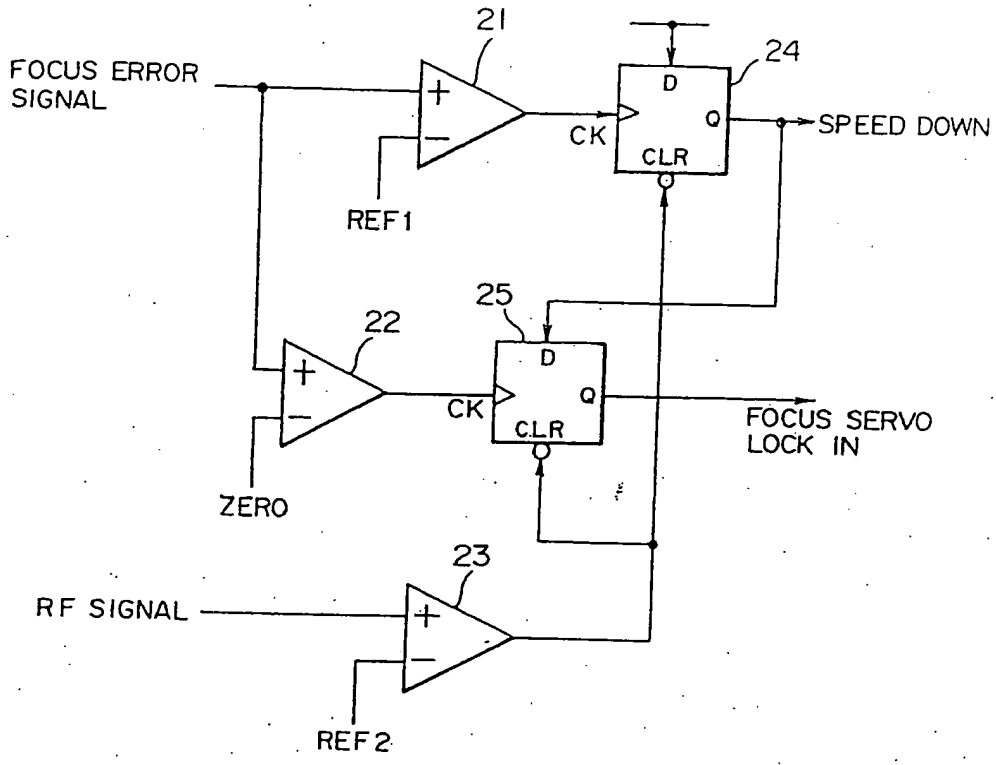

21
24
FOCUS ERROR SIGNAL
D
Q
CK
CLR
SPEED DOWN
REF1
25
22
D
Q
CK
CLR
FOCUS SERVO LOCK IN
ZERO
23
RF SIGNAL
REF2

FIG. 2

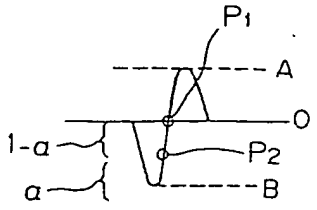

P1
A
0
1-a
a
P2
B

FIG. 3

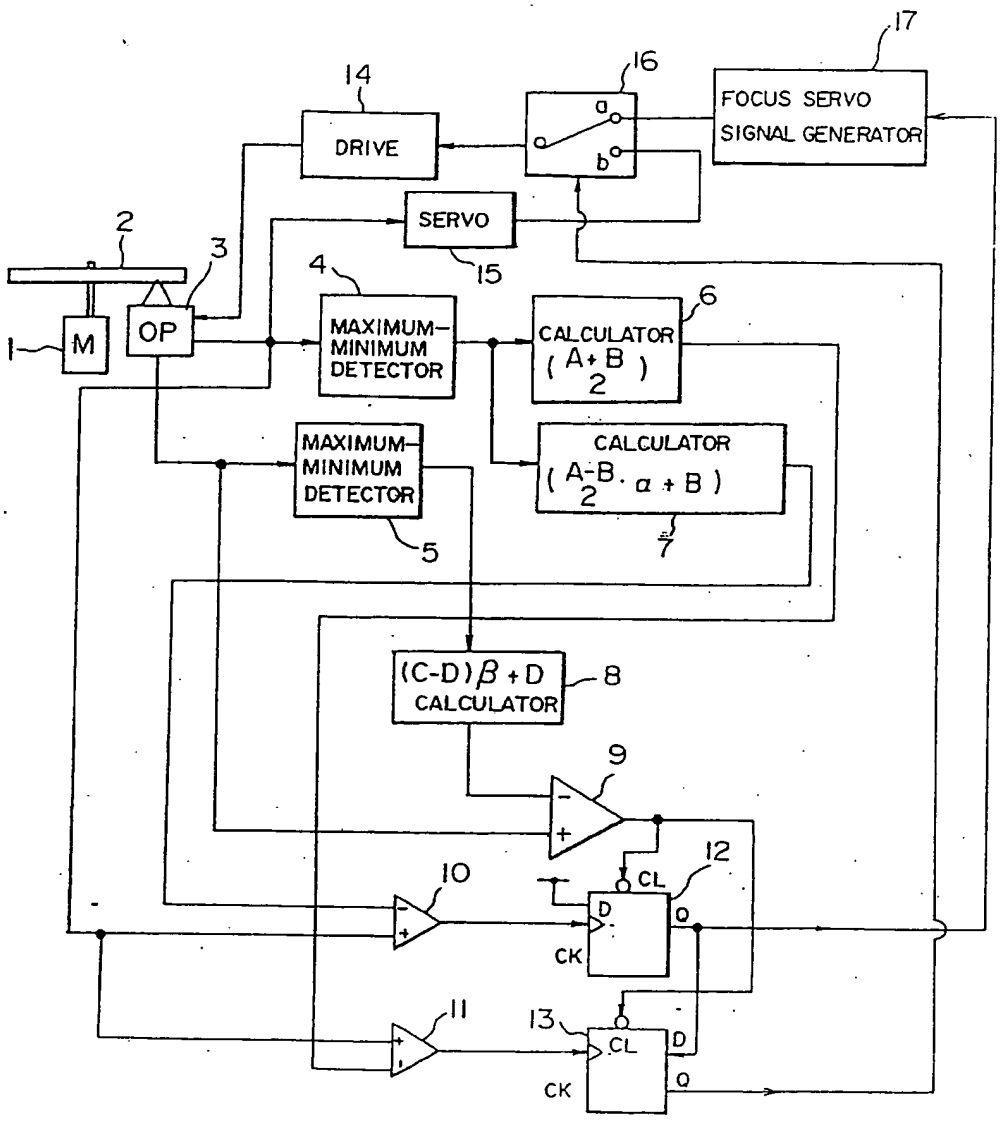
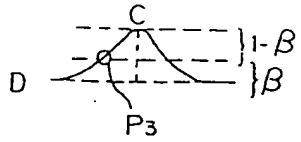

17
14
16
FOCUS SERVO SIGNAL GENERATOR
DRIVE
a
b
SERVO
15
2
3
4
6
1
M
OP
MAXIMUM-MINIMUM DETECTOR
CALCULATOR (A+B / 2)
MAXIMUM-MINIMUM DETECTOR
5
CALCULATOR (A-B/2 · α + B)
7
(C-D)β+D CALCULATOR
8
9
10
12
CL
D
Q
CK
11
13
CL
D
CK
Q

FIG. 4


C
1-β
β
D
P3